

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Claims 2-17 are amended.

Listing of Claims:

1. (Original) Method for modifying electronic properties of a sample surface to analytical ends, comprising in situ deposition of neutral cesium (Cs^0), under ultra-high vacuum, said neutral cesium being enabled in the form of a collimated adjustable stream, said Cs^0 deposition being simultaneously accompanied by a primary bombardment of said surface, in the form of at least a beam comprising electrons and/or ions or neutral atoms or groups of atoms, or by an X-ray irradiation, intended to induce a secondary emission or sputtering of particles for analysis, out of the surface, said sputtering comprising secondary electrons and/or Cs_x^{n+} and/or MCs_x^{n+} positive clusters ($x = 1, 2$) and/or M^{n-} negative ions and/or M^{m+} positive ions, M being a constituent of the sample material made of an atom or a group of atoms (n, m integers), the Cs^0 deposition being decoupled from the primary bombardment conditions, to provide a simultaneous optimization of deposited Cs^0 concentration and analytical characteristics, such as the depth resolution, characterized in that said optimized deposited Cs^0 concentration is chosen only by adjusting the ratio ($\tau = v_{er}/v_D$) between the erosion rate (v_{er}) and the Cs^0 deposition rate (v_D), for a given sample and given primary bombardment conditions.
2. (Currently Amended) Method according to Claim 1, ~~characterized, in that~~ wherein said optimized deposited Cs^0 concentration is continuously adjustable according to the relation :

$$c_{\text{Cs}} = \frac{1}{1 + (\tau - 1) \cdot \frac{\rho_M}{\rho_{\text{Cs}}} + \frac{\tau}{Y}},$$

wherein ρ_M is the density of the sample constituent, ρ_{Cs} the atomic density of the layer of Cs formed and Y the sputtering yield characterizing the primary bombardment conditions for the sample considered.

3. (Currently Amended) Method according to Claim 1 ~~or 2, characterized, in that~~ wherein the stream of Cs^0 is provided and collimated in a column by means of :

- a temperature adjustment of an evaporator comprising a metallic cesium reservoir, and/or
 - an aperture control of a motorized obturator located in the path of the cesium stream.
4. (Currently Amended) Method according to Claim 3, ~~characterized in that~~ wherein the reservoir temperature range is maintained between 70 and 90 °C, corresponding to a pressure range from 1.10^{-4} to 4.10^{-4} mbar and in that the stability of the deposition rate is about 2% over 60 minutes.
 5. (Currently Amended) Method according to ~~anyone of Claims 1 to 4,~~ characterized in that Claim 1, wherein it is coupled to static or dynamic Secondary Ion Mass Spectroscopy (SIMS), preferably operating in the MCs_x^+ mode ($x = 1, 2$).
 6. (Currently Amended) Method according to Claim 5, ~~characterized in that~~ wherein the deposition rate of Cs^0 is continuously adjustable in the range from 0 to 10 Å/s, corresponding about to 0 – 4 monolayers per second.
 7. (Currently Amended) Method according to ~~anyone of Claims 1 to 4,~~ characterized in that Claim 1, wherein it is coupled to electron spectroscopy.
 8. (Currently Amended) Method according to Claim 7, ~~characterized in that~~ wherein electron spectroscopy is selected from the group consisting of Auger Electron Spectroscopy (AES), Electron Energy Loss Spectroscopy (EELS), X-Ray Photoemission Spectroscopy (XPS) and Ultraviolet Photoemission Spectroscopy (UPS).
 9. (Currently Amended) Method according to Claim 1, ~~characterized in that~~ wherein it further enables a stream of a chemical element other than Cs, evaporated under ultra-high vacuum, to create secondary emission for analytical purposes of $\text{M}_1\text{M}_2^{n+}$ clusters or M_2^{m-} ions or M_2^{m+} ions (n, m integers) or electrons, wherein M_1 and M_2 are respectively the atoms or groups of atoms constituted by the chemical element other than Cs and the atoms or groups of atoms from the sample.
 10. (Currently Amended) Method according to Claim 1, ~~characterized in that~~ wherein the sole adjustable deposition rate of Cs^0 or a chemical element other than Cs to an optimized value enables to optimize the intensity of secondary particles emitted by the sample.
 11. (Currently Amended) Method according to Claim 1, ~~characterized in that~~ wherein the useful yield, i.e. the sensitivity of the secondary emission species, preferably M^{n-} , M^{m+} , and still more preferably Cs_x^{n+} and MCs_x^{n+} , is approximately optimized solely by adjusting said ratio (τ).

12. (Currently Amended) Method according to Claim 3, ~~characterized in that~~ wherein the stream of Cs^0 is automatically and continuously adapted via the obturator.
13. (Currently Amended) Energy and/or mass analyzer instrument for carrying out the method according to ~~anyone of the preceding Claims 1 to 12~~ Claim 1, comprising a neutral cesium (Cs^0) deposition column, capable of delivering an adjustable and stable stream of pure neutral cesium, said neutral cesium column being usable simultaneously with a primary bombardment or a primary irradiation column, and comprising an evaporation block (1) including a reservoir (5) filled with pure metallic cesium, equipped with temperature control means (6,7), prolonged by a tube (2,11) up to a gun end piece (13) located close to the sample and equipped with beam collimation means (12), characterized in that said tube (2, 11) and gun end piece (13) equipped with beam collimation means (12) are further equipped with temperature control means (8,14,15) for preventing condensation and obturation risks.
14. (Currently Amended) Instrument according to Claim 13, ~~characterized in that~~ wherein the evaporation block (1) is located in an external part which can be isolated from the main chamber (3) of the instrument by means of a gate valve (4) and capable of being separately pumped and vented.
15. (Currently Amended) Instrument according to Claim 13 ~~or 14, characterized in that~~ ,wherein said beam collimation means comprise a motorized continuously adjustable obturator (12), preferably comprising a rotary disk using a slit of continuously variable width (16), said disk being driven by a stepper motor (17).
16. (Currently Amended) Instrument according to ~~anyone of Claims 13 to 15, characterized in that~~ Claim 13, wherein, at the operation temperature, the neutral cesium (Cs^0) is in liquid state and the evaporation block (1) lies with an inclination angle such as said liquid remains in the bottom of the reservoir (5) under gravity effect.
17. (Currently Amended) Instrument according to ~~anyone of Claims 13 to 15~~ Claim 13, preferably a static or dynamic secondary ion mass spectrometry (SIMS) instrument, comprising a primary bombardment column and a secondary column equipped with secondary ion extraction means, a mass spectrometer, preferably of the type TOF (Time-Of-Flight), quadrupolar or with magnetic sector and ion detection means.